Segmentation project

Mila - technology transfer

Project definition: The goal of the project is to disentangle the Mila logo from any image. To do it, we ask you to use a deep learning approach for semantic segmentation. We expect your model to predict if the logo overlaps or not for each pixel of an image. To train your model, we provide you a training set of 22,470 RGB images with `(height=340, width=512)` pixels in JPG format and their associated masks in BMP format. Most are natural images but their content is random. The original logo image is an RGBA image with `(height=400, width=797)` pixels. We transform the logo with several random transformations:

1. flip in the left/right direction,
2. rotate with an angle $\theta \in [0; 2\pi]$,
3. swirl with a strength in $[-5; 5]$ and a radius of 500 pixels,
4. scale down by a factor in $[0.1; 0.38]$,
5. translate in the image boundary,
6. α-blend with the image with $\alpha \in [0.1; 0.4]$.

Each of the first three transformations is executed with probability 0.5. All parameters are sampled from a uniform distribution over their respective domain. The α-blend transformation is a convex combination $(1 - \alpha)\, img + \alpha\, logo$ of the image with the logo. Finally, a logo can appear several times in an image. The number of occurrences is chosen randomly in $\{1, 2, 3\}$. The transformations were performed with the `skimage 0.14.2` library[1].

[1] `https://scikit-image.org/`

Deliverable: We expect you to provide the code for training and testing the model. The code must include a script for testing your best model on new images from a given directory:

```
python infer.py <image_dir> <output_dir>
```

The `<output_dir>` will contain the predicted masks associated with each image. The filenames must be the same between `<image_dir>` and `<output_dir>`. We provide the evaluation script, `evaluation.py`, so that you can test your code. Please note that we will take into account the quality of the code in terms of readability and performance.

We also expect a short report (max. 5 pages) describing your methodology, the model architecture and its motivation, the experimental settings, the computational resources used (e.g. GPU type)[2], explaining the model performance, and what you would do to improve your baseline. Finally, your model will be evaluated with the Intersection over Union (IoU) metric on a separate hidden test set. The final results will be communicated to you during the hiring process. The report and the code must be submitted in an archive file **at last 48 hours** after receiving this file. Good luck!

[2]If you don't have access to a GPU, you can use the Colab platform at `https://colab.research.google.com/`.